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(54) Dye compositions

(57) A dye composition for treating hair comprises a direct dye, a cationic silicone surfactant, a hydroxy functional silicone derivative and a liquid vehicle.

Preferred silicone surfactants are amine functional silicones and quaternary ammonium functional silicones and further surfactants, which are cationic or non-ionic, may be included in the composition.

The hydroxy functional silicone derivative is preferably present together with a long chain fatty alcohol, ester or ketone as suspending or solubilising agent.

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SPECIFICATION

Compositions

The present invention relates to dye compositions useful in dyeing natural fibres, and in particular for dyeing human hair.

Direct dyes are commonly used to colour fibrous materials, for instance human hair, for a limited time and may be useful when repeated changes in colour are required. However, direct dyes often impart a low colour intensity to a substrate and safety considerations may prevent the use of more concentrated compositions.

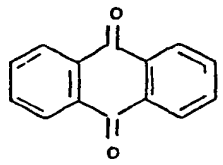
Semi-permanent dye compositions which are presently available will usually colour human hair for up to about six subsequent shampoo washes, although a high proportion of colour is lost after 2 or 3 washes. It has now been discovered that by using a hydroxy functional silicone derivative in combination with a cationic silicone derivative, increased permanency of dye deposited on hair, coupled with hair conditioning benefits, can be achieved. The use of the hydroxy functional silicone derivative is thought to provide improved adhesion of cationic silicone to hair and increased resistance to removal by washing, the dye material being deposited within or under the silicone coating which is formed on the hair during treatment.

According to the present invention there is provided a dye composition for treating hair, comprising a direct dye; a cationic silicone surfactant which comprises a cationic silicone derivative; an hydroxy functional silicone derivative; and a liquid vehicle.

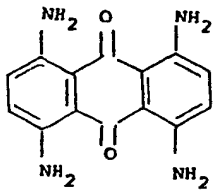
Preferably, the composition of the invention includes a solubilising or suspending agent for the hydroxy functional silicone derivative, and examples of suitable agents are long chain fatty alcohols, esters and ketones. The solubilising or suspending agent is preferably present in an amount of from 0.1 to 5.0% by weight of the composition.

Examples of direct dyes include anthraquinone, azo, nitro, basic, triarylmethane or disperse dyes, or any combination thereof.

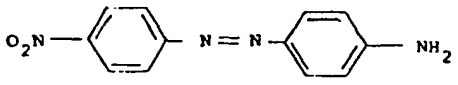
Anthraquinone dyes are those containing the group



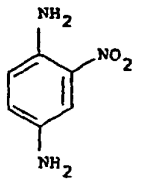
and a particular example is Disperse Blue No. 1, of formula



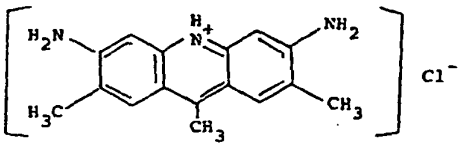
Azo dyes are those containing the –N=N– group, and a particular example is Disperse Orange No. 3, of formula



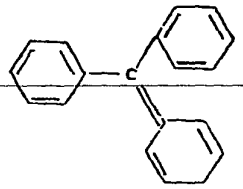
Nitro dyes are those containing the $-NO_2$ group, and a particular example is 2 nitro-p-phenylene diamine, of formula



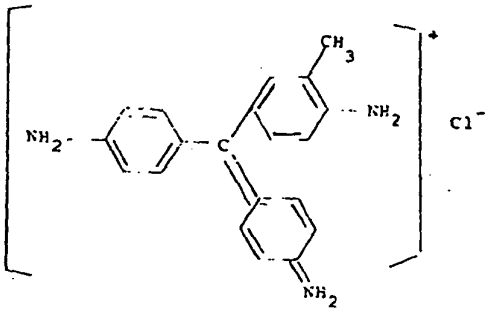
Basic dyes are those containing coloured cations, and a particular example is Basic Yellow 9, of formula



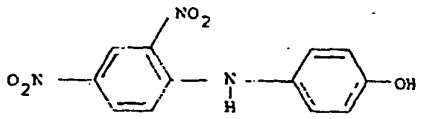
Triarylmethane dyes are those containing the group



and a particular example is Basic Violet 14, of formula



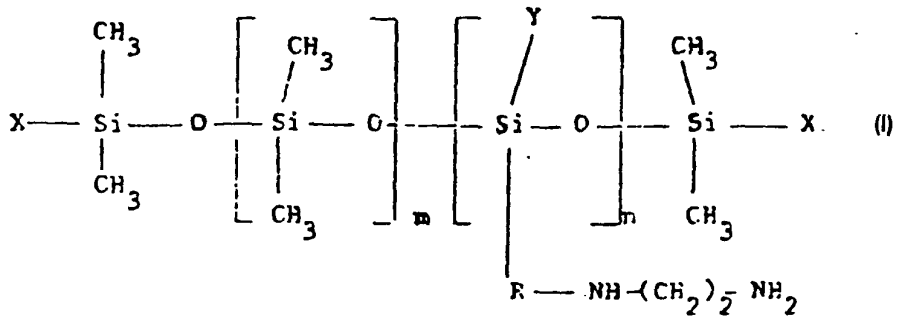
Disperse dyes are those which are substantially insoluble in water and are used as a dispersion in the medium. A particular example is Disperse Yellow 1 of formula



The total dye content is preferably in the range 0.01 to 10% by weight of the composition. Suitably the dye, or when a mixture of dyes is used, each dye, may be present in an amount of from 0.01 to 5% by weight, preferably 0.01 to 3%.

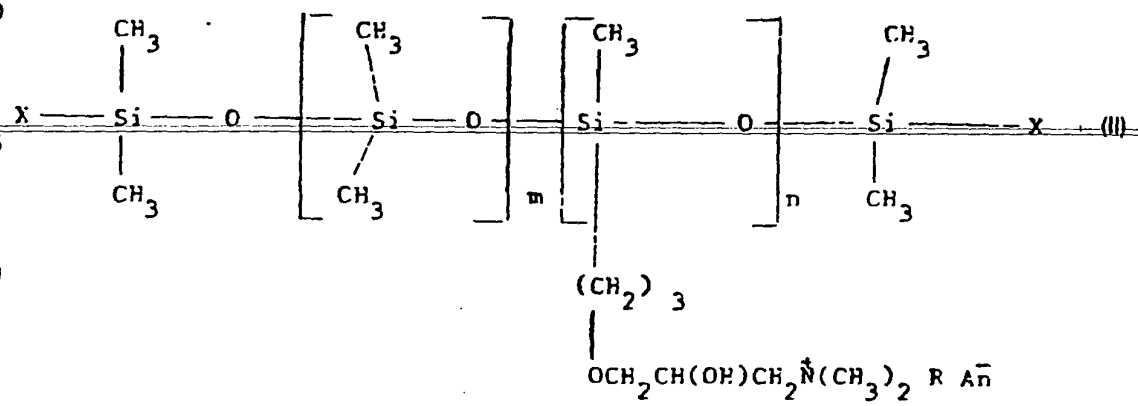
Examples of cationic silicone surfactant include:

(i) Amine functional silicones of the general formula (I),



in which X and Y, which may be the same or different, are each C_{1-6} alkyl, preferably $-CH_3$, or $-OH$, R is C_{1-3} alkyl and m and n are each integers of from 1 to 100,

(ii) Quaternary ammonium functional silicones of the general formula (II),



in which X and Y are as defined in formula (I), R is a long chain alkyl group, m and n are each integers of from 1 to 100 and An is a halide ion, such as Cl Br or I .

The total amount of silicone surfactant in the composition of the invention is preferably from 0.1 to 5.0% by weight, more preferably 0.1 to 3.0% by weight.

The hydroxy functional silicone derivative is preferably a low molecular weight, flake silicone solid, and a particularly preferred example is manufactured by Dow Corning under the trade name Silicone DF 11/884.

The total amount of hydroxy functional silicone derivative is preferably from 0.1 to 3.0% by weight, more preferably 0.1 to 1.0% by weight.

The compositions of the invention may optionally include further surfactants which may be cationic or non-ionic to modify the antistatic, combability and gloss properties of the substrate.

The content of further cationic surfactant may be within the range of 0.1 to 5.0% by weight of the composition, more preferably 0.1 to 3.0% by weight.

Non-ionic surfactant may be present in the composition of the invention at from 0.1 to 5.0% by weight of the composition, preferably in the range of 0.1 to 3.0% by weight.

It will be appreciated that in formulating the composition, the skilled cosmetic formulator would consider the toxicity of each component and would accordingly use a non-toxic amount of dye, surfactant or any other component.

The compositions of the invention may also comprise conventional toiletries additives such as thickening agents, opacifiers, pearlescent agents, sequestrants, colour stabilising agents, perfumes, preservatives, glycols and other dye solubilisers.

The pH of the compositions of the invention may be from 4 to 10, preferably from 5 to 7. If necessary the pH may be adjusted using conventional agents.

When used herein the term 'liquid vehicle' includes water or water admixed with other non-aqueous liquids which together can dissolve or support the direct dye, cationic silicone surfactant and hydroxy functional silicone derivative.

In a further aspect the present invention provides a process for the preparation of the dye composition of the invention which comprises mixing the hydroxy functional silicone derivative with a solubilising or suspending agent and heating the mixture to dissolve the derivative, adding

the cationic silicone derivative to the mixtur at ambient temperature, adding the direct dye to the resultant mixture, the dye having been optionally pre-dispersed, suspended or dissolved in a suitable medium, and adding optional ingredients to obtain the final composition.

Preferably, the hydroxy functional silicone derivative is dissolved in the solubilising or suspending agent, such as a long chain fatty alcohol, ester or ketone, by warming to a temperature of from about 70°C to 80°C.

Preferably, the liquid vehicle in the composition of the invention comprises an emulsion base, to which the cationic silicone derivative and hydroxy functional derivative are both added, together with additional, optional surfactants.

Further toiletries additives may be added at any convenient stage in the process preferably before final pH adjustment.

The direct dye may be in dry powder form or, as described above, may be predispersed, suspended or dissolved in a suitable solvent, preferably a glycol for example glycerin or propylene glycol.

The invention further provides a method for treating non-human or human hair comprising applying an effective, non-toxic amount of composition as hereinbefore defined to the hair.

The compositions of the invention will now be illustrated by way of the following Examples.

Example 1	Weight Percent
Hydroxy propyl guar	0.7
Amodimethicone and Tallotrimonium Chloride and Nonoxynol-10	1.0
Hydroxy functional silicone [Dow Corning Silicone DF 11/884]	0.5
Cetyl alcohol	1.5
Glycerin	4.5
N^4-(2-hydroxy ethyl)-2-nitro-p-phenylene diamine	0.4
4-Nitro-o-phenylene diamine	0.2
Perfume	qs
Preservatives	qs
Deionised water	qs to 100

Example 2	Weight Percent
Hydroxy propyl guar	0.7
Trimethyl silylamodimethicone (and) Octoxynol-40 (and) Isolaureth -6 (and) glycol	1.0
Hydroxy functional silicone [Dow corning Silicone DF 11/884]	1.5
Cetyl alcohol	4.5
Glycerin	1.0
N^4-(2-hydroxy ethyl)—2-nitro-p-phenylene diamine	qS
Perfume	qS
Preservative	qS to 100
Deionised water	

Example 3	Weight Percent
Hydroxyl ethyl cellulose	0.9
Quaternary ammonium functional polydimethyl siloxane (Dow Corning Silicone X2-8109)	1.0
Hydroxy functional silicone [Dow Corning Silicone DF 11/884]	0.5
Isodecyl isononanoate	1.5
Glycerin	4.5
2-nitro-p-phenylene diamine	0.5
Perfume	qS
Preservative	qS
Deionised Water	qS to 100

Example 4	Weight Percent
Hydroxy propyl methyl cellulose	1.5
Polysiloxane Polydimethyl dialkyl ammonium acetate copolymer	1.0
Hydroxy functional silicone [Dow Corning Silicone DF 11/884]	0.5
Stearyl alcohol	1.5
Glycerin	4.5
2-Nitro-P-Phenylene diamine	0.05
4-Nitro-O-Phenylene diamine	0.4
Perfume	qS
Preservative	qS
Deionised Water	qS

Dyeing Properties—Test Procedure

Hair tresses were prepared using virgin human hair (1g) bound with waxed twine. The colourant composition of Example 1 (0.5g) was applied evenly to the dampened hair tress and allowed to penetrate for 20 minutes before being rinsed in warm water. The tresses were then dried with warm air. A number of dyed tresses were prepared and bundled together. Shampoo (0.05g per 1g hair) was applied to the wet hair tresses, lathered and rinsed in warm water. This process was repeated once more, to represent a complete 'wash'. After the tresses had been dried, one was removed from the bundle before the washing procedure was repeated again. At the end of the test period the colours of the tresses were assessed in natural daylight.

The above procedure was repeated using a colourant composition containing all the ingredients of Example 1, but without the hydroxy functional silicone.

Results

When dyed tresses were repeatedly shampooed over a period of several days, significantly more colour was retained by the tresses which had been dyed with the formulation of example 1, than was retained by tresses dyed with the formulation of Example 1 *without* the hydroxy functional silicone.

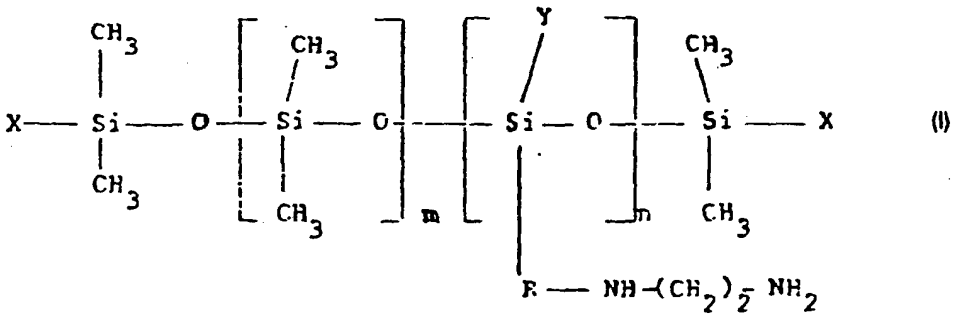
CLAIMS

1. A dye composition for treating hair, comprising a direct dye, a cationic silicone surfactant, a hydroxy functional silicone derivative and a liquid vehicle.

2. A composition according to claim 1 in which the cationic silicone surfactant comprises a cationic silicone derivative.

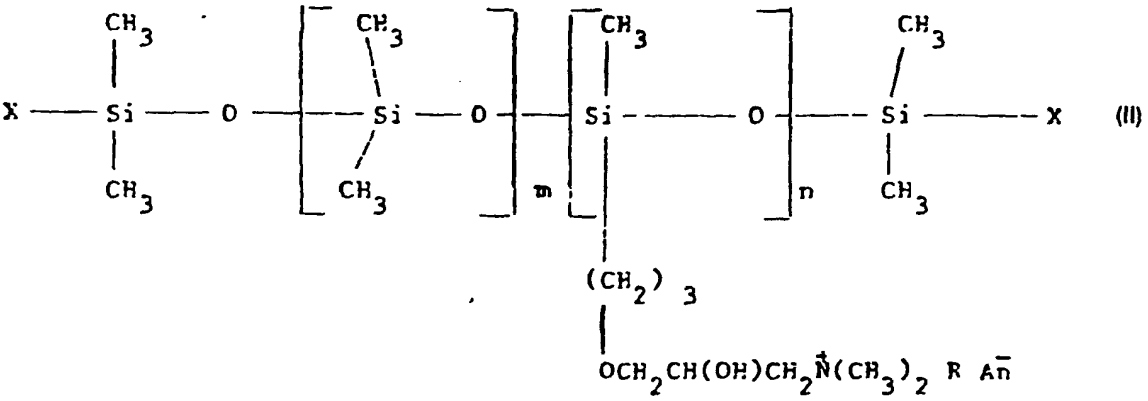
3. A composition according to claim 1 or 2 in which there is included a solubilising or suspending agent for the hydroxy functional silicone derivative.

4. A composition according to any one of claims 1 to 3 in which the cationic surfactant is selected from (i) amine funtional silicones of the general formula;



(I)

(ii) quaternary ammonium functional silicones of the general formula;



(II)

5. A composition according to any one of claims 1 to 4 in which the direct dye is selected from anthraquinone, azo, nitro, basic, triarylmethane or disperse dyes.

6. A composition according to any one of claims 1 to 5 in which the total dye content is present in the range 0.01 to 10% by weight of the composition.

7. A composition according to any one of the claims 1 to 6 in which the total cationic silicone surfactant content is present in the range 0.1 to 5% by weight of the composition.

8. A composition according to any one of claims 1 to 7 additionally comprising a non-ionic surfactant.

9. A composition according to any one of claims 1 to 7 additionally comprising a cationic surfactant.

10. A composition according to claims 8 or 9 wherein the additional surfactant is present in the range from 0.1 to 5% by weight of the composition.

11. A dye composition for treating hair, substantially as hereinberfore described in any one of the examples.

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